

REMARKS

Claims 1-27 are pending in the present application. Claim 9 has been amended. The claim has been amended to cure the rejections of the claims under 35 U.S.C. §112, second paragraph as explained in detail below. This amendment merely more definitely claims the present invention and does not narrow the scope thereof. No new matter has been introduced by this amendment. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

1. Claim Rejections Under the Judicially Created Doctrine of Obviousness-Type Double Patenting

Claims 1-27 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-41 of U.S. Patent No. 6,214,309. A Terminal Disclaimer is submitted herewith.

2. Claim Rejections Under 35 U.S.C. §112, second paragraph

Claims 1-27 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter which the Applicants' regard as the invention. In particular the Examiner has stated that the use of the term "high energy" in Claims 1, 1-4, 9, 16, and 23 is indefinite because the term is subjective and unclear. Applicants disagree.

High-energy ball milling is a known term of art in the Mechanical Alloying field. High-energy ball milling describes milling with ball speeds greater than about 1 meter/second (m/sec) in order to generate impact pressures greater than 10^8 Newtons/square meter (N/m^2) during ball collision. Typically ball speeds are in the range of about 1 m/sec to about 10 m/sec. It is the high impact pressures that induce the structural and energy state changes of the reactants so that the reactivity of the reactants increased.

In support of our assertion that "high energy ball milling" is a term of art, Applicants submit herewith copies of three web pages from two different universities. These web pages employ the term "high energy ball milling" in the course of providing a general description of research currently being conducted, clearly indicating that it is a well understood term of art. Applicants respectfully assert that "high energy" when coupled with ball milling is neither subjective nor unclear.

The Examiner has rejected Claims 3 and 24, apparently because the Examiner believes that the word "mixture" should replace "combination". Applicants do not see any significant difference between the two terms, thus Applicants do not believe that the term "combination" is indefinite. Accordingly, if the Examiner maintains this rejection, Applicants respectfully request a more complete explanation of the rejection.

The Examiner has rejected Claims 8, 14, and 23 by stating " 'nanostructured' is unclear as to whether crystallite size is meant." (Paper 7, page 2) Applicants respectfully assert that the term "nanostructured" is defined beginning on page 1, line 13 to page 2, line 4 of the application as filed and as such is not indefinite.

Claim 9 has been rejected due to the phrase "metal precursor". Applicants have amended the claim to contain "metal source" as suggested by the Examiner.

In view of the foregoing amendments and remarks withdrawal of the rejection of Claims 1, 3, 4, 8, 9, 14, 16, 23, and 24 under 35 U.S.C. §112 and allowance of said claims is respectfully requested.

3. Claim Rejections Under 35 U.S.C. §103(a)

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,651,950 to Lee et al. taken with U.S. Patent No. 5,030,286 to Crawford et al. The Examiner has summarized Lee and Crawford as follows:

Lee teaches in col.3-4 mixing pitch and silica, grinding and forming a carbide. While not teaching 'high energy' milling, Lee teaches small carbon pellets. Thus intense, energetic grinding is suggested. Crawford teaches in column 5 milling to make small particles. (Paper 7, page 3)

The Examiner has asserted that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the milling of Crawford in the process of Lee "because doing so makes the small particles desired." (Paper 7, page 3) Applicants disagree with the Examiner's summary of Lee as well as the Examiner's assertion of obviousness.

Lee discloses that the mesophase of coal-tar pitch is highly reactive and can be used a catalyst to produce silicon carbide. (Col.1, lines 49-62 and Col. 2, line 52-53). Lee goes on to discuss at length in Col. 3 the conditions necessary to produce large quantities of mesophase from β -resin and mixtures of β -resin and α -resin. β -resin and α -resin are

components of coal tar pitch. In discussing the conditions necessary for the development of mesophase from β -resin and α -resin, Lee discloses that the β -resin and α -resin must be heated to develop the mesophase and describes the developing mesophase regions as "pellets". (Col. 3, lines 8-47) Lee discloses a preference for larger mesophase regions (or pellets) by preferring 5% of α -resin (Col. 3, line 45). The presence of α -resin at 5% results in larger mesophase pellets. (Col. 3, lines 31-33)

Lee then discloses a method for producing silicon carbide employing a mesophase catalyst. First β -resin, α -resin and silica gel are combined and evenly mixed in an ultrasonic vibrator. The mixture is then heated to dryness, but at a temperature too low to promote the formation of a mesophase. The mixture is then ground to form a powder. The powder is then heated to culture the mesophase and then the temperature is further raised to form the silicon carbide. (Col. 3, line 58 to Col. 4, line 4) Thus it is clear that at the time grinding occurs no mesophase pellets exist and the disclosure of Lee cannot be construed as teaching small carbon pellets obtained by grinding as indicated by the Examiner. Lee discloses forming a silicon carbide through the use of mesophase catalyst and does not teach or suggest high-energy milling.

Crawford is directed to silica slurries and methods of making them. In making the silica slurries, high intensity shear mills can be employed. High intensity shear mills are different from high-energy ball mills. Thus, Crawford does not teach or suggest the use of a high intensity ball mill.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed.

Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants assert that the Examiner has failed to establish a prima facie case of obviousness due to the fact that none of the references contain any teaching of high-energy ball milling. Accordingly, Applicants respectfully request withdrawal of the rejection.

Claims 3 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lee et al. taken with Crawford et al. and further in view of U.S. Patent No. 4,742,029 to Kurachi et al. The combination of Lee and Crawford is discussed. Kurachi has been cited for its teaching with regard to carbon sources and does not teach or suggest high energy ball milling. Applicants believe that the Examiner has failed to establish a prima facie case of obviousness and request withdrawal of the rejection.

4. Claim Rejections Under 35 U.S.C. §102(e)

Claims 1-5, 7-14, 16-21, and 23-26 stand rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 5,746,803 to Dunmead et al. Dunmead et al. disclose a method of forming a transition metal carbide-Group VIII metal powder comprising heating an admixture of a particulate precursor, Group VIII metal powder source and a finishing source of carbon to a temperature of about 1173K to about 1773K under hydrogen-containing atmosphere. The particulate precursor can be formed by the method described in U.S. Patent No. 5,380,688. The reactants required for the formation of the particulate precursor "can be mixed by any convenient technique such as V-blenders, jet mills, and ball mills" (Col. 7, lines 55-57). Example 1 of U.S. Patent No.

5,380,688 discloses that one step in the process of making a particulate precursor is ball milling at 50 RPM. The Examiner has asserted "While not explicitly teaching 'high energy', the 50 rpm recited appears to be 'high'." (Paper 7, page 4) Applicants disagree.

As explained above high-energy ball milling describes milling with ball speeds greater than about 1 meter/second (m/sec) in order to generate impact pressures greater than 10^8 Newtons/square meter (N/m^2) during ball collision. Typically ball speeds are in the range of about 1 m/sec to about 10 m/sec. A ball milling speed of about 200 rpm is generally considered to be the lower limit for ball milling speeds because it gives rise to a ball speed of 1.04 m/sec. Armed with this knowledge it is clear that the ball milling described by Dunmead et al. is a conventional mixing step and not high-energy ball milling.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants believe the Dunmead et al. does not provide an adequate basis for a rejection under 35 U.S.C §102(e) or 35 U.S.C. §103(a) because Dunmead et al. does not contain all the elements of the pending claims, high-energy ball milling in particular. Accordingly, Applicants earnestly request reconsideration and allowance of the claims.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants.

Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by the Applicants' Attorney.

Respectfully submitted,

SHAW ET AL.

CANTOR COLBURN LLP
Applicants' Attorneys

By: Patricia S. DeSimone
Patricia S. DeSimone
Registration No. 48,137
Customer No. 23413

Date: June 28, 2002
Address: 55 Griffin Road South, Bloomfield, Connecticut 06002
Telephone: (860) 286-2929

A marked up version of the paragraph appearing under the heading

CROSS REFERENCE TO RELATED APPLICATIONS follows:

This application claims priority to U.S. Application Serial No. 60/152,497, filed September 2, 1999, and to U.S. Application Serial No. 08/936,868, filed September 24, 1997, now U.S. Patent No. 6,214,309 B1 both of which are fully incorporated herein by reference.

A marked up version of Claim 9 follows:

9. A method for the synthesis of micron- or submicron-sized, carbide cermet powders, comprising
- high-energy ball milling a mixture of a carbon precursor, at least one of a precursor of SiC, TiC, VC, HfC, ThC₂, ThC, Cr₃C₂ WC, W₂C, ZrC, TaC, Ta₂C, or NbC, and a metal precursor source to form a milled powder; and
- annealing the milled powder to form micron- or submicron-sized, carbide cermet powders.